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existential spatial continua, though Bergson would not grant this. Even then the task lies before him of proving that continuous extension can be analyzed into continuity plus a somewhat,—which is either extension, or else something other than extension. But in the former case, the validity of Bergson's distinction between mathematical space and extension is not impugned but justified. So, if Professor Spaulding is to give us an adequate analysis of space, it therefore remains that he tell us what that is, which is not extension, but which, added to mathematical continuity, will give us continuous extension.[3] Then and then only can he claim to have analyzed space,—by giving us the inverse synthesis.

The same considerations as to the relation of mathematics to experience apply, in double measure, to time and the other topics of Professor Spaulding's paper. In short, as I said before, the article left me with many doubts and queries: has he refuted Bergson; has he given us analysis, or is it synthesis; has he given us an exhaustive account, not merely of the mathematical properties of mathematical space, but of real space as well?

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REVIEWS AND ABSTRACTS OF LITERATURE

Instinct and Experience. C. LLOYD MORGAN. New York: The Macmillan Company. 1912. Pp. 298.

Readers of *The British Journal of Psychology* will recall the articles on Instinct by Lloyd Morgan, Stout, Myers, McDougall, and Wildon Carr which appeared in that magazine,[1] and will remember that the papers were written for a joint symposium on the subject which was held by the Aristotelian Society, the British Psychological Association, and the *Mind* Association, in the summer of 1910. Professor Morgan, in the present book, taking as a kind of text his own views and those of some of the others who shared in the discussion, elaborates a statement of what we may call his philosophy of science. The earlier chapters, on "Instinctive Behavior and Experience," "The Relation of Instinct to Experience," "Reflex Action and Instinct," and "Hereditary Dispositions and Innate Tendencies," serve as a fuller expression of the author's views on the immediate subject of the symposium. Instinct is defined as "that which is on its first occurrence independent of prior experience; which tends to the well-being and preservation of the race, which is similarly performed by all the members of the same more or less restricted group of animals, and which may be subject to subsequent modification under the guidance of experience." He maintains that the performance of instinctive actions depends wholly on subcortical connections, but that during their performance the cortex receives afferent impulses from the external situation, from the movements of the animal, and from its visceral disturbances. It is by virtue of this effect on the cortex that instinct is later modifiable and that instinctive action differs from reflex action. On the other hand, instincts, as based on subcortical connections, are to be distinguished from innate mental tendencies, such as Mozart's gift for music, which rest on congenital cortical dispositions. The effect of experience on the instinctive response to a situation is to give the situation meaning, and meaning, Professor Morgan distinguishes as either primary or secondary. Primary meaning is furnished by what the author calls primary retention, which is virtually what Fechner called the memory after-image, and what Poppelreuter, under the term "*Secundärerlebnis*" has recently been making the foundation of the higher mental processes. In the sequence of events *a b c d, a b c* is still lingering in consciousness when *d* appears, and by thus lingering it constitutes the primary meaning of *d.* Secondary meaning can exist only when the experience is being repeated: in this case, when *c* occurs, there is a vague anticipation or preperception of *d,* which constitutes the secondary meaning of *c.* Action guided by secondary meaning is intelligent. While rejecting McDougall's curious doctrine that instinct is guided by inherited images, Morgan is not unwilling to grant that some very vague preperceptions, based on innate cortical dispositions, may exist at the first performance of an instinctive act. To this the reviewer would assent only in so far as it implies the statement that an inherited expectant attitude may exist in certain situations; if the kinesthetic sensations from this attitude constitute a preperception, then a preperception may occur at the first performance of an instinctive movement. This would hardly be what Professor Morgan means, however, as an inherited attitude would be based on subcortical connections.

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[3] Let it be borne in mind that I am here inquiring about the relation of mathematical to empirical space, and not of metrical to ordinal geometry, except as the latter relationship exactly represents the former, which itself is part of the question at issue.

[1] Vol. III.

In the last four chapters of the book, on "The Ground of Experience," "Natural History and Experience," "The Philosophy of Instinct," and "Finalism and Mechanism: Body and Mind," the author passes to the consideration of more fundamental problems. To Bergson, whose views were, in the original symposium, championed by Wildon Carr, the major part of the critical discussion is given, and in many respects Professor Morgan's treatment of the French philosopher is sympathetic. For instance, he would not deny that there exists in us a power of intuition which is set over against understanding and thought. It is by this power that we apprehend the process of experiencing, whether in ourselves or in others, as distinguished from the objects experienced: "the *ing* rather than the *eds* of experience." But he objects strongly, and in the reviewer's opinion most justly, to that feature of Bergson's method which "founds on the results of analysis a sundering of orders of existence." The processes of change, of experiencing, which for Bergson belong to the vital alone, may exist in all reality, inorganic as well as organic. Professor Morgan might have added that since thought can apply its system of concepts to the world of the vital and psychical as well as to the world of "dead matter," while intuition can feel itself into the processes of change in the inorganic physical world as well as into those of life and mind, a far more systematic account of reality is given by regarding the worlds of "description and appreciation," of "objects and will-attitudes," to use the terms of two of our American philosophers, as different interpretations of the entire world order rather than as two world orders. If the Bergsonian philosophy says that system is not what is desired, it furnishes but another example in the history of thought of the attempt of philosophy to deny its own ends.

Professor Morgan, finally, rules out of scientific discussion altogether any question as to the ultimate source or ground of the world order, and rejects as a violation of this limitation the incursion of any entelechy, vital force, or Bergsonian pure memory into the realm of phenomena. The world order is one. Yet he is willing to admit that there may be vital phenomena which physico-chemical laws are inadequate to explain, and psychological phenomena which biological laws are inadequate to explain. But these remainders must not be accounted for by referring them to extra-phenomenal sources; we must simply "seek to correlate phenomena which will not submit to identification."

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Experimental Psychology and Pedagogy. R. SCHULZE. English translation by RUDOLPH PINTNER. New York: The Macmillan Company. 1912. Pp. xxiv + 364.

Few texts dealing with the application of psychology surpass this book in the quality of the typography (although the glazed paper is somewhat tiring to the eye), in the number (314) and excellence of the illustrations, and in the clearness of exposition, suggestiveness, and freshness of treatment.

The reading of this compendium will prove refreshing to the professional experimental and educational psychologists—although they will find little material within its pages not already familiar to the specialist—and very informing and stimulating to the student, pedagogue, school administrator, and lay reader. The author's aims are to give an exposition of those mathematical and experimental methods of scientific psychology which are applicable to the solution of experimental problems in education, and to set forth a few typical results already obtained in experiments on sensation, perception, ideas, feeling, volition, attention, consciousness, assimilation, memory, apperception, speech, physical and mental work, and psychical correlation. An ingenious chronoscope of the author's invention, said to be superior to the Hipp, is also illustrated and described.

Schulze shows considerable ingenuity in the suggested educational applications which he makes of various psychological experiments, but he